

Western Washington Clean Buses, Healthy Kids Retrofit Project



**A grant proposal
to the U.S. Environmental Protection Agency
in response to Solicitation #OAR-CCD-03-07**

Puget Sound Clean Air Agency
Southwest Clean Air Agency
Olympic Region Clean Air Agency
Northwest Air Pollution Control Authority

July 2003

1. **Title:** Western Washington Clean Buses, Healthy Kids Retrofit Project

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3. Implementation Plan

Summary

The four western Washington regional air quality agencies are joining together to propose the Western Washington Clean Buses, Healthy Kids Retrofit Project for EPA funding. The purpose of our cooperative proposal is to begin pilot retrofit programs in small, rural school districts. Many of the rural communities in Washington have suffered economically as logging, fishing and other traditional industries have experienced a substantial, sustained downturn. These communities have a significantly higher percentage of families below the poverty level compared to the state as a whole.

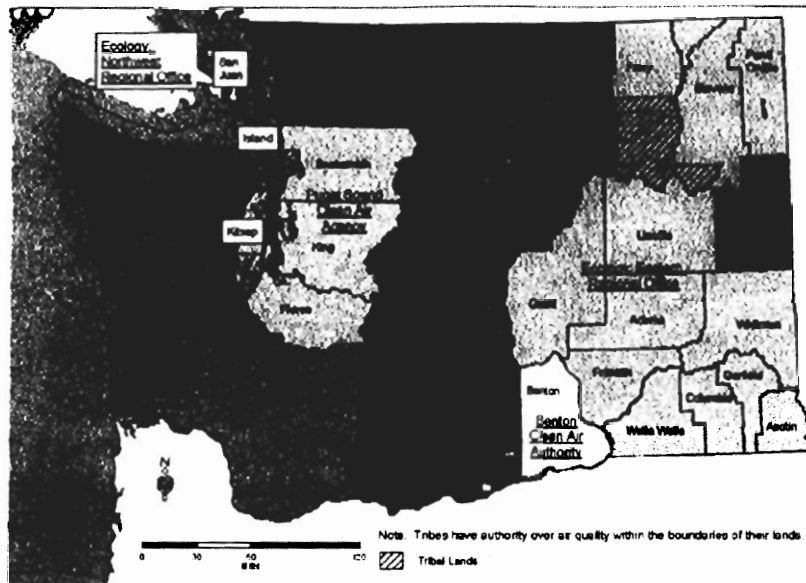
We have selected the school districts serving:

- Sedro-Woolley in Skagit County (Northwest Air Pollution Control Authority), and
- Aberdeen/Hoquiam in Grays Harbor County (Olympic Region Clean Air Agency),
- Centralia/Chehalis in Lewis County (Southwest Clean Air Agency),
- South Kitsap in Kitsap County (Puget Sound Clean Air Agency).

Students in these districts tend to have longer bus rides on older buses than those in urban areas, increasing their exposure to diesel emissions.

The following map shows the locations of the sponsoring regional air quality agencies:

Clean Air Agencies of Washington



Timeline and Project Phases

The partners submitting this proposal intend to move forward quickly to install EPA-verified retrofits and use ultra-low sulfur diesel fuel (ULSD), where available, on the four fleets. The project will be implemented in four phases. During the first phase, the local air agencies and partner school districts will finalize the lists of vehicles and retrofit devices. This phase is expected to be complete within one month of receiving the EPA grant award. The second phase of the project is the procurement and installation of diesel oxidation catalysts (DOC) on the 139 candidate vehicles. It has been our experience that, from the date of selection of a contractor, procurement and installation of the DOC requires approximately 60 days. The third phase, procurement of catalyzed diesel particulate filters (CDPF), will begin with the use of ULSD fuel by the Sedro-Woolley and South Kitsap school districts. ULSD is available locally from two refineries at a cost differential of approximately five cents per gallon (plus additional transportation costs) more than 350 ppm sulfur diesel fuel. We expect the Sedro-Woolley and South Kitsap school districts will begin using ULSD within 60 days of receiving the award. We have developed a simple contracting mechanism to reimburse districts for the incremental cost of ULSD fuel and intend to use this approach with Sedro-Woolley and South Kitsap. The need for temperature profiling of the candidate vehicles for the CDPF will necessitate a longer time frame for purchase and installation of the filters. We expect that installation of these devices will require six months. The final, or fourth, phase, is the preparation of a report covering how we trained staff, the strategies we employed, how we tracked progress, and our emission reduction results.

Statewide School Bus Initiative

During the 2003 legislative session, the Washington State Legislature enacted Engrossed Substitute Senate Bill 6072 which provides partial funding for school bus retrofits throughout Washington State. Funds from this bill are spread over a five-year period beginning in mid-

2003. Although the funding only covers a portion of the total cost to retrofit all of the state's school bus fleets, it has spurred the development of efficient processes to implement a school bus retrofit program in our state. Grant funding from EPA would provide a needed addition to state funds and would be managed through these newly developed processes. The Washington Department of Ecology, Office of the Superintendent of Public Instruction and regional clean air agencies throughout the state are partnering to develop this program. The group has formed a policy steering committee. The steering committee is working with the State Department of General Administration to negotiate state contracts with pre-qualified retrofit vendors. This approach will take advantage of bulk purchase prices and minimize the paperwork required to deliver quality goods and services to our school districts. This approach will demonstrate and document how to successfully implement projects that reduce pollution from school buses. The lessons learned will be useful to other programs across the country.

Subgrant Administration Process

The Puget Sound Clean Air Agency will provide fiscal management for this project and will deliver retrofits and related services through a "subgrant process" to each of the four partner school districts. We have an experienced grants management and technical staff and the resources to successfully manage this grant. Although we have not quantified the value of this in-kind match, it represents a substantial commitment of staff resources in addition to our proposed 25 percent local match of EPA grant funding. Fleet managers prefer "turnkey" retrofit projects, given limited school district resources. Therefore, we will provide these services to each district using a qualified contractor.

As stated previously, the Puget Sound Clean Air Agency is part of a state-wide effort to deliver retrofit services to school districts through a state contract. If this contract is available at the time of EPA award, we will use this mechanism to deliver the retrofits. If not, we will use our competitive request for proposal (RFP) process to identify and contract for these services. Either approach will assure that we obtain quality goods and services at the lowest possible price.

Policy Support

The Puget Sound Clean Air Agency, along with a consortium of partners, developed the Diesel Solutions program to make diesel vehicles in the central Puget Sound region dramatically cleaner. Our program was officially announced by former EPA Administrator, Governor Christine Whitman, at a press conference in Seattle on July 10, 2001. This voluntary initiative introduced ULSD into western Washington several years prior to the federal mandate for this clean fuel. The availability of this cleaner fuel enables a wide range of public and private fleets to retrofit diesel vehicles both in the central Puget Sound region and throughout western Washington. This is a model program with experience that can be readily transferred to other U.S. urban areas. The Puget Sound Clean Air Agency's Director, Dennis McLerran, and other staff have assisted areas throughout the U.S. and in British Columbia, Canada, interested in implementing similar programs.

King County, the City of Seattle, Boeing, and others are using ULSD fuels for their transit and other heavy-duty vehicle fleets and have begun installing retrofit devices in a multi-year

commitment to reduce toxic and fine particle emissions by up to 90 percent. The Everett School District and its fleet contractor Durham School Services, the Washington State Department of Transportation Ferries Division, and the Port of Seattle are all initial partners in this effort. We have recently added fleet partners including the City of Tacoma, Kitsap Transit, Community Transit, Sound Transit, North Kitsap Schools, Chief Leschi Tribal School, McChord Air Force Base, and Kent Schools. Our partners have committed funding for over 2,000 retrofits.

Sustainability

We are developing a sustainable infrastructure in Washington State to successfully support clean school bus efforts. Local agencies in Washington including Spokane County Air Pollution Control Authority and the Puget Sound Clean Air Agency have already completed school bus retrofit projects in Everett and Spokane, Washington and on the Puyallup Indian Reservation. These pilot projects have used a mix of DOC and CDPF. A 48-bus retrofit project in the North Kitsap School District (Kingston, WA) is underway and will be completed by the September 2003. As a result of recently enacted state legislation supporting school bus retrofits and piloting clean fuel for school buses, the school districts, State Office of the Superintendent of Public Instruction, State Department of Ecology, State Department of General Administration and regional clean air agencies are implementing a statewide clean school bus program focusing on retrofits and clean fuels. This partnership has evolved from earlier efforts by the Puget Sound Clean Air Agency, Puget Sound Clean Cities Coalition, Spokane County Air Pollution Control Authority, and the American Lung Association of Washington to educate our school districts about the health impacts of exposure to diesel exhaust and the options for reducing these impacts.

In addition, we are partnering with the Department of Ecology's Air Quality Program on their anti-idling campaign "Dare to Care About the Air." This campaign will be based upon a recently completed study by PRR, Inc. for the Department of Ecology. The study and its recommendations focus on reducing idling near schools, both by school buses and other vehicles. The campaign is expected to begin with four pilot elementary and middle schools in Brush Prairie, Cheney, Seattle and Everett, Washington. The pilot schools will use both school and media tool kits of materials. State and local air agencies are seeking separate funding for the pilot project and a continuing statewide program.

Financial Participation

Our contribution consists of a 25 percent match with state funds appropriated by the state legislature for fiscal year 2004 (July 1, 2003, through June 30, 2004). The funding we are using for the match is generated by Washington State taxes and fees.

Fleet

Our partner school districts own, maintain and operate their fleets. Table 1 summarizes our proposed retrofit plan which consists of both CDPFs and DOCs. ULSD fuel will be used by the fleets with CDPFs. We will work with the other two fleets to transition them to ULSD as well,

in anticipation of retrofitting their newest vehicles with CDPFs at a later date. We have summarized data on each of the buses in the four fleets in Appendix A, Equipment List.

Table 1

School District	Students Transported Daily	Total Buses in Fleet	DOC retrofits	Filter Retrofits	Total Retrofits
Sedro-Woolley	2,100	42	25	5	30
Aberdeen/Hoquiam	1,130	37	28		28
Centralia/Chehalis	3,000	69	38		38
South Kitsap	10,397	83	48	16	64
Total	16,627	231	139	21	160

Notes: DOC means EPA-certified diesel oxidation catalysts

Filter retrofits means EPA-certified catalyzed diesel particulate filters

Equipment

Equipment will be purchased and installed under contract with qualified vendors using only EPA-verified diesel retrofit technology. Contracts will contain specific language requiring that the contractor provide evidence of verification. We expect to be able to access pre-qualified contractors for procurement and installation of equipment through a contract or contracts negotiated by the Washington State Department of General Administration. If these contracts are not available, the Puget Sound Clean Air Agency will use its competitive bid process to select qualified contractors. These contractors will work directly with technical project managers at the appropriate western Washington clean air agency and with the appropriate school district's fleet manager.

The partners will install either DOCs or CDPFs depending upon the bus model year, engine and exhaust temperature profile. A DOC reduces emissions of carbon monoxide (CO), hydrocarbon (HC), and the soluble organic fraction of diesel particulate matter (PM) through catalytic oxidation alone. Exhaust gases are not filtered, as in the CDPF. In the presence of a catalyst material and oxygen, CO, HC, and the soluble organic fraction undergo a chemical reaction and are converted into carbon dioxide and water. A DOC can reduce total particulate emissions up to 30 percent, and up to 50 percent with use of ULSD. Use of a DOC reduces carbon monoxide emissions by 40 percent and hydrocarbon emissions by up to 50 percent. A passive CDPF reduces PM, CO and HC emissions through catalytic oxidation and filtration. Most of the CDPFs sold in the United States use substrates consisting of ceramic wall-flow monoliths to capture the diesel particulates. The filter is positioned in the exhaust stream to trap or collect a significant fraction of the particulate emissions while allowing the exhaust gases to pass through the system. Effective operation of a CDPF requires a balance between PM collection and PM oxidation, or regeneration. Regeneration is accomplished by either raising the exhaust gas temperature or by lowering the PM ignition temperature through the use of a catalyst. Passive CDPFs have demonstrated reductions in excess of 90 percent for PM, along with similar reductions in CO and HC emissions.

4. **Summary of funds requested from EPA:**
\$366,000 (to be matched with \$122,000 in local funds)

5. Total cost of project - \$488,000

6. Detailed Budget

Table 2

Category	EPA Grant	Agency Match
Personnel	0	
Fringe Benefits	0	
Contractual Costs	\$366,000	\$122,000
Travel	0	Not applicable
Equipment	0	Not applicable
Supplies	0	Not applicable
Other	0	Not applicable
Total Direct Costs	0	
Total Indirect Costs	0	
Total Costs	\$366,000	\$122,000

The agency expects to install 139 DOCs at \$1,900 per bus, 21 CDPFs at a total of \$8,000 per bus with two spare CDPF filter sections at \$3,750 each for a total of \$439,600. The incremental cost for ULSD is expected to be \$40,000 over the two years (at an incremental cost of 10 cents per gallon). Annual CDPF filter maintenance is estimated at \$8,400 for two years (21 filters at \$200 per filter times two years).

7. Project period: November 1, 2003, through November 1, 2005

8. Report Schedule

The Puget Sound Clean Air Agency will provide quarterly progress reports to EPA, summarizing:

- Number of and type of devices installed
- Expected criteria pollutant emission reductions
- Any problems encountered as well as the solutions to those problems

When the project is complete, the Puget Sound Clean Air Agency will calculate the final expected emission reduction from each of the retrofitted vehicles as well as the expected annual fleet-wide emission reduction calculated by school district. We will provide a detailed final report summarizing the project's problems, successes and lessons learned. The report will also include information on how staff was trained, overall strategies employed, and emissions reduction data.

Appendix A, Equipment List

Table 3 – Sedro-Woolley School District

The Sedro-Woolley school district fleet uses 85,000 gallons of fuel and travels 590,000 miles annually.

Manufacturer	Year	Type of Retrofit
INT	2003	CDPF
INT	2003	CDPF
INT	2003	CDPF
INT	2003	CDPF
INT	2003	CDPF
BLUE	1999	DOC
BLUE	1999	DOC
BLUE	1999	DOC
BLUE	1999	DOC
BLUE	1999	DOC
BLUE	1998	DOC
BLUE	1998	DOC
BLUE	1995	DOC
THOMAS	1994	DOC
BLUE	1993	DOC

BLUE	1993	DOC
BLUE	1992	DOC
BLUE	1992	DOC
BLUE	1992	DOC
BLUE	1992	DOC
BLUE	1991	DOC
BLUE	1991	DOC
BLUE	1990	DOC
BLUE	1990	DOC
BLUE	1990	DOC
BLUE	1990	DOC
BLUE	1990	DOC
BLUE	1990	DOC
BLUE	1990	DOC
BLUE	1989	DOC
BLUE	1989	DOC

Table 4 – Aberdeen/Hoquiam School Districts

The Aberdeen/Hoquiam school district fleet uses 70,400 gallons of fuel and travels 350,000 miles annually.

Manufacturer	Year	Type of Retrofit
THOMAS	1999	DOC
THOMAS	1999	DOC
THOMAS	1998	DOC
THOMAS	1998	DOC
THOMAS	1998	DOC
BLUE	1998	DOC
THOMAS	1997	DOC
THOMAS	1997	DOC
THOMAS	1997	DOC
FORD	1997	DOC
THOMAS	1996	DOC
THOMAS	1996	DOC
WAYNE	1995	DOC
THOMAS	1995	DOC

Manufacturer	Year	Type of Retrofit
CARP	1995	DOC
CHEVY	1994	DOC
THOMAS	1993	DOC
THOMAS	1993	DOC
THOMAS	1992	DOC
THOMAS	1992	DOC
COLLINS	1992	DOC
BLUE	1991	DOC
CARP	1990	DOC
BLUE	1989	DOC
BLUE	1987	DOC
BLUE	1987	DOC
THOMAS	1984	DOC
THOMAS	1984	DOC

Table 5 – Centralia/Chehalis School Districts

The Centralia/Chehalis school district fleet uses 58,400 gallons of fuel and travels 425,000 miles annually. Buses are in operation 38,000 hours annually.

Manufacturer	Year	Engine
BLUE	1998	DOC
BLUE	1998	DOC
BLUE	1998	DOC
BLUE	1998	DOC
BLUE	1998	DOC
BLUE	1998	DOC
BLUE	1998	DOC
BLUE	1998	DOC
BLUE	1998	DOC
THOMAS	1995	DOC
THOMAS	1995	DOC
OSHKOSH	1993	DOC
OSHKOSH	1993	DOC
OSHKOSH	1993	DOC
INTL	1993	DOC
INTL	1993	DOC
FORD	1992	DOC
FORD	1992	DOC
BLUE	1991	DOC
BLUE	1991	DOC
BLUE	1991	DOC
BLUE	1990	DOC
BLUE	1989	DOC
BLUE	1989	DOC
BLUE	1988	DOC
BLUE	1988	DOC
BLUE	1988	DOC
BLUE	1988	DOC
BLUE	1987	DOC
BLUE	1987	DOC
INTL	1986	DOC
INTL	1986	DOC
BLUE	1985	DOC
BLUE	1985	DOC
BLUE	1985	DOC
BLUE	1985	DOC
THOMAS	1984	DOC
THOMAS	1984	DOC
CHEVY	1984	DOC

Table 6 – South Kitsap School District

The South Kitsap school district fleet uses 129,223 gallons of fuel and travels 730,283 miles annually. Buses are in operation 76,500 hours annually.

Manufacturer	Year	Type of Retrofit
BLUE	2003	CDPF
BLUE	2003	CDPF
BLUE	2003	CDPF
BLUE	2003	CDPF
BLUE	2003	CDPF
BLUE	2001	CDPF
BLUE	2001	CDPF
BLUE	2000	CDPF
BLUE	2000	CDPF
BLUE	2000	CDPF
BLUE	2000	CDPF
BLUE	2000	CDPF
BLUE	2000	CDPF
BLUE	2000	CDPF
BLUE	2000	CDPF
BLUE	2000	CDPF
GM	1999	DOC
GM	1999	DOC
GMC	1994	DOC
GMC	1994	DOC
CARP	1994	DOC
CARP	1994	DOC
CARP	1994	DOC
CARP	1994	DOC
CARP	1994	DOC
CARP	1994	DOC
THOMAS	1993	DOC
THOMAS	1993	DOC
THOMAS	1993	DOC
THOMAS	1993	DOC
THOMAS	1993	DOC
THOMAS	1993	DOC
THOMAS	1993	DOC

Manufacturer	Year	Type of Retrofit
GMC	1993	DOC
GMC	1993	DOC
GMC	1993	DOC
GMC	1991	DOC
GMC	1991	DOC
GMC	1991	DOC
GMC	1991	DOC
GMC	1991	DOC
THOMAS	1990	DOC
THOMAS	1990	DOC
THOMAS	1990	DOC
THOMAS	1990	DOC
THOMAS	1989	DOC
THOMAS	1989	DOC
THOMAS	1989	DOC
THOMAS	1989	DOC
THOMAS	1989	DOC
THOMAS	1987	DOC
THOMAS	1987	DOC
THOMAS	1987	DOC
GMC	1987	DOC
GMC	1987	DOC
GMC	1986	DOC
GMC	1986	DOC
GMC	1986	DOC
GMC	1986	DOC
GMC	1986	DOC
GMC	1986	DOC
CROWN	1984	DOC
CROWN	1984	DOC
CROWN	1984	DOC